REMARKS/ARGUMENTS:

Claims 5-24 are canceled without prejudice. Claims 25-33 are pending in the application. Reexamination and reconsideration of the application, as amended, are respectfully requested.

The present invention relates to a solar cell element with electrodes coated with solder. The present invention also relates to a solar cell module comprising a plurality of solar cell elements connected to one another by means of connection electrodes. (Applicant's specification, at p, 1, lines 7-12).

CLAIM REJECTIONS UNDER 35 U.S.C. § 103:

Claims 5, 6, 23-25, 32, and 33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsuzuki et al. (U.S. Patent No. 6,479,744) in view of Wood et al. (U.S. Patent No. 6,150,717). This rejection is moot with respect to claims 5, 6, 23, and 24 due to the cancellation of these claims. Applicant respectfully traverses this rejection as to claims 25, 32, and 33. Claim 25 is as follows:

> A method for producing a solar cell module, comprising:
>
> providing a solar cell element having a front surface electrode formed on a light-receiving surface of a semiconductor substrate thereof, and a back surface electrode formed on a non-light receiving surface of the semiconductor substrate;
>
> connecting a first inner lead to the front surface electrode or the back surface electrode of the solar cell element, by melting a first solder layer that is disposed therebetween, wherein the first inner lead comprises a metal foil; and
>
> connecting a second inner lead to an electrode of the solar cell element to which the first inner lead is not connected, by melting the second solder layer that is disposed therebetween and has a lower

melting point than the first solder layer, after performing the above connecting the first inner lead, wherein the second inner lead comprises a metal foil.

Applicant respectfully submits that the cited references cannot render claim 25 obvious, because the cited references fail to teach or suggest "connecting a first inner lead to the front surface electrode or the back surface electrode of the solar cell element, by melting a first solder layer that is disposed therebetween, wherein the first inner lead comprises a metal foil; and connecting a second inner lead to an electrode of the solar cell element to which the first inner lead is not connected, by melting the second solder layer that is disposed therebetween and has a lower melting point than the first solder layer, after performing the above connecting the first inner lead, wherein the second inner lead comprises a metal foil."

It is an aspect of the present invention that since the solder on the surface of the connection tab 17 on the light-receiving surface has a higher melting point than the solder on the surface of the connection tab 19 on the non-light receiving surface, the connection tab 17 on the light-receiving surface does not remelt even when heat is applied to attach the connection tab 19 on the non-light receiving surface nor peel off from the bus bar electrode 5 on the light-receiving surface. (Applicant's specification, at p. 24, lines 7-14).

In Tsuzuki, a backside electric power withdrawing member 1003 is connected to the conductive substrate by laser welding. (Tsuzuki, column 13, lines 35-39). Tsuzuki fails to teach or suggest the step of "connecting a first inner lead to the front surface electrode or the back surface electrode of the solar cell element, by melting a first solder layer that is disposed therebetween, wherein the first inner lead comprises a metal foil."

In Tsuzuki, a metal member 1006 is fixed by heating and pressing together with the collector electrode 1005. (Tsuzuki, column 13, lines 55-65). Tsuzuki fails

to teach or suggest the step of "connecting a second inner lead to an electrode of the solar cell element to which the first inner lead is not connected, by melting the second solder layer that is disposed therebetween and has a lower melting point than the first solder layer, after performing the above connecting the first inner lead, wherein the second inner lead comprises a metal foil." In Tsuzuki, the metal member 1006 and the backside electric power withdrawing member 1003 are connected by soldering. (Tsuzuki, column 14, lines 5-10).

The Office at p. 3, line 17-p. 4, line 9 of the Office Action states,

> "Tsuzuki is silent about how the metal member 1006 and the electric power withdrawing member 1003 are soldered on the respectively surfaces and fails to teach that the two soldering layers have different melting points. However, Wood et al. discloses a method for mounting electrical interconnections with solder to the electrodes of the semiconductor device (col. 1; lines: 15-24) and further discloses that one of the solder alloys can be a high temperature alloy and the other solder alloy a low temperature alloy and that it aids in the assembly of the semiconductor module (col. 9; lines: 6-22). Wood teaches that when an electrode is of a lower melting temperature and the solder is of a higher melt temperature, then the solder can be reflowed to form bonded connections (col. 9; lines: 61-67). The solder temperature is chosen between the melt temperature of the electrode and solder melt temperature to allow for the solder to soften and not enter the liquid phase, such that it will have a structural rigidity (col. 9; lines: 61-67). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate two different solders with different melting points as suggested by Wood in order to aid in the assembly of the semiconductor in the method of Tsuzuki to produce a solar cell module."

Applicant respectfully disagrees. Wood teaches a method of producing a multichip module which connects a plurality of DDC dice to a support substrate. Specifically, a solder bump 12M having a high melting point provided on a DDC dice 10M and a solder bump 96 having a low melting point provided on a supporting substrate 94 are connected to fix the DDC dice 10M to the supporting substrate 94. (Wood, column 8, line 62–column 9, line 22, Figs. 11A-11E).

However, Wood's invention is to form a single solder connection structure by using two alloys, namely the bump 12M and the bump 96, wherein the bump 12M has a structure rigidity to prevent the DDC dice 10M from collapsing on the supporting substrate 94. (Wood, column 9, line 62–column 10, line 12).

Therefore, if Wood's teaching were to be applied to the teachings of Tsuzuki, it would be assumed that a photovoltaic device be produced by a step of connecting a front metal member to a front surface electrode of a device via a front solder connection structure from two bumps, and/or by a step of connecting a back metal member to a back surface electrode of the device via a back solder connection structure from two solder bumps.

As such, there is no motivation to combine the teachings of Tsuzuki and Wood so that two bumps can be applied to different connection structures separately in the manner suggested by the Office, absent impermissible hindsight reasoning gleaned from the present invention.

In addition, in Tsuzuki, the front surface solder and the back surface solder are both melted and each contributes to the separate solder connection structures. In contrast, in Wood the bump 12M with a high melting point is never melted. If in Wood the bump 12M melts, the DDC dice 10M collapses on the supporting substrate 94. Therefore, there would be no motivation to combine Tsukuki with Wood since the modification would render the prior art unsatisfactory for its intended purpose.

The MPEP at 2141.03(V) states,

> "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification."

Furthermore, in the present invention, the first solder layer having a higher melting point is melted first, then the second solder layer having a lower melting point is melted. Wood fails to teach the order of melting of the present invention.

In light of the foregoing, Applicant respectfully submits that the cited references cannot render claim 25 obvious, because the cited references fail to teach or suggest each and every claim limitation. Claims 32 and 33 depend from claim 25 and cannot be rendered obvious for at least the same reasons as claim 25. Withdrawal of this rejection is thus respectfully requested.

Claims 7 and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsuzuki and Wood as applied to claims 6 and 25 above, and in further view of Nakahara et al. (JP 2002/346788). This rejection is moot with respect to claim 7 due to the cancellation of this claim. Applicant respectfully traverses this rejection as to claim 26.

Claim 26 depends from claim 25; and therefore, cannot be rendered obvious over Tsuzuki and Wood for at least the same reasons discussed above. Nakahara cannot remedy the defect of Tsuzuki and Wood and is not relied upon by the Office for such. Instead, the Office cites Nakahara for teaching a lead-free, Sn-Ag based solder alloy that is an environmentally sound alternative to Pb-based solder while providing high joint dependability.

In light of the foregoing, Applicant respectfully submits that the cited references cannot render claim 26 obvious, because the cited references fail to teach or suggest each and every claim limitation. Withdrawal of this rejection is thus respectfully requested.

Claims 8-10 and 27-29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsuzuki and Wood as applied to claims 5 and 25 above, and in further view of Okada et al. (U.S. Patent No. 6,571,469). This rejection is moot with respect to claims 8-10 due to the cancellation of these claims. Applicant respectfully traverses this rejection as to claims 27-29.

Claims 27-29 depend from claim 25; and therefore, cannot be rendered obvious over Tsuzuki and Wood for at least the same reasons discussed above.

Okada cannot remedy the defect of Tsuzuki and Wood and is not relied upon by the Office for such. Instead, the Office cites Okada for teaching a soldering method for the manufacture of a modular board with multiple electrodes.

In light of the foregoing, Applicant respectfully submits that the cited references cannot render claims 27-29 obvious, because the cited references fail to teach or suggest each and every claim limitation. Withdrawal of this rejection is thus respectfully requested.

Claims 11, 12, 30, and 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsuzuki and Wood as applied to claims 5 and 25 above, and in further view of Mizukami et al. (U.S. Patent No. 6,369,315) and Okada. This rejection is moot with respect to claims 11 and 12 due to the cancellation of these claims. Applicant respectfully traverses this rejection as to claims 30 and 31.

Claims 30-31 depend from claim 25; and therefore, cannot be rendered obvious over Tsuzuki, Wood, and Okada for at least the same reasons discussed above. Mizukami cannot remedy the defect of Tsuzuki, Wood, and Okada and is not relied upon by the Office for such. Instead, the Office cites Mizukami for teaching a power generation system specifically for use with an array of photovoltaic modules. The Office further cites Mizukami for teaching connecting the photovoltaic array via bus bars and the bus bars contain extensions that are connected directly to "an output fetching line" via a terminal box.

In light of the foregoing, Applicant respectfully submits that the cited references cannot render claims 30-31 obvious, because the cited references fail to teach or suggest each and every claim limitation. Withdrawal of these rejections is thus respectfully requested.

Applicant believes the foregoing amendments comply with requirements of form and thus may be admitted under 37 C.F.R. § 1.116(b). Alternatively, if these amendments are deemed to touch the merits, admission is requested under

37 C.F.R. § 1.116(c). In this connection, these amendments were not earlier presented because they are in response to the matters pointed out for the first time in the Final Office Action.

Lastly, admission is requested under 37 C.F.R. § 1.116(b) as presenting rejected claims in better form for consideration on appeal.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (310) 785-4600 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
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Date: March 4, 2009

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